

REMARKS

Claims 1-8, 10, 11-17, 23-26 and 53-59 remain in the application. Claims 1-8, 10-17, and 23 are rejected. Claims 24-26 and 53-59 are allowed. Claim 1 has been amended.

Applicant gratefully acknowledge allowed claims 24-26 and 53-59.

Applicants respectfully request reconsideration of the rejections set forth in this Office Action in light of the following remarks.

Please cancel claims 9, 18-22 and 27-52 without prejudice to further prosecution.

Rejections under 35 U.S.C. § 112

Claim 1 has been amended for the purposes of clarification. Claims 1-8, 10-17 and 23-26 are amended to recite,

a support structure for securing the portion of the polymer at the first position wherein the portion of the polymer is stretched from an initial surface area to the first surface area to improve the mechanical response of the transducer when it deflects from the first position to the second position and wherein the support structure is for supplying a force to the stretched portion of the polymer that prevents the stretched portion of the polymer from returning from the first surface area to about its initial surface area and wherein a ratio of the first surface area to the initial surface area is in the range of about 1.5 to 50. Applicant believes the amendment to claim 1 overcomes examiners rejection in regards to a "finished portion of the polymer" and "fixing the stretched portion of the polymer."

Applicant believes the amendment adds no new matter and is supported at least page at 10, lines 1-12 as follows:

The electroactive polymer 102 is pre-strained. The pre-strain improves conversion between electrical and mechanical energy. In one embodiment, pre-strain improves the dielectric strength of the polymer. For the transducer 100, the

pre-strain allows the electroactive polymer 102 to deflect more and provide greater mechanical work. Pre-strain of a polymer may be described in one or more directions as the change in dimension in that direction after pre-straining relative to the dimension in that direction before pre-straining. The pre-strain may comprise elastic deformation of the polymer 102 and be formed, for example, by stretching the polymer in tension and fixing one or more of the edges while stretched. In one embodiment, the pre-strain is elastic. After actuation, an elastically pre-strained polymer could, in principle, be unfixed and return to its original state. The pre-strain may be imposed at the boundaries using a rigid frame or may be implemented locally for a portion of the polymer.

The amendment is also supported at page 10, lines 34-35 as follows:

In one embodiment, the polymer is pre-strained by a factor in the range of about 1.5 times to 50 times the original area.

Thus, Applicant now believes the rejection under 35 U.S.C. § 112 is overcome thereby.

Rejections 35 U.S.C. § 103

Claims 1-8, 11-17, 23 are rejected under 35 U.S.C. §103(a) as being unpatentable over Pelrine "Electrostriction of Polymer Films for Microactuators" in view of Scheinbeim, Lemonon or Ravinet. Applicant respectfully traverses.

As recited by the Examiner, "Pelrine does not explicitly teach pre-strain of between 1.5 to 50 times the original dimensions."

Scheinbeim, Lemonon and Ravinet each teach stretching a material during manufacture of the material. After the material is stretched, it maintains an unsupported shape. For instance, in Scheinbeim the stretching is performed via cold rolling. After cold rolling, the material maintains its new shape/dimensions without support. In Lemonon and Scheinbeim, the material is thermoformed. After thermoforming, the material maintains its new shape without support.

In contrast, in the present invention, a support structure is used "for securing the portion of the polymer at the first position wherein the portion of the polymer is stretched from an initial surface area to the first surface area to improve the mechanical response of the transducer when it deflects from the first position to the second position and wherein the support structure is for supplying a force to the stretched portion of the polymer that prevents the stretched portion of the polymer from returning from the first surface area to about its initial surface area and wherein a ratio of the first surface area to the initial surface area is in the range of about 1.5 to 50."

The combinations of Pelrine and Scheinbeim, Lemonon or Ravinet do not teach or suggest, in a transducer using a polymer to stretch (pre-strain) the portion of the polymer to improve the mechanical response of the transducer during operation in the manner and the ranges suggested in claim 1. In Scheinbeim, Lemonon or Ravinet, a support structure to provide the forces used to maintain at least a 50% stretch of the material is not described. Also, these references do not provide any teaching or motivation for a transducer configured in this manner. As previously described in the Amendment dated Feb. 4, 2003 in response to the office action of November 4, 2002, Applicant respectfully asks the Examiner to consider that, in the present invention, the improved mechanical response of the device resulting from pre-strain of the polymer or operating the polymer at high strains was an "unexpected result" not described in the prior art and not a result of routine experimentation for the purposes of optimization. Therefore, for at least these reasons, Applicant believes that the combinations of Pelrine and Scheinbeim, Lemonon or Ravinet can't be said to render obvious claims 1-8, 11-17 and 23 and the objection is believed overcome thereby.

Applicant believes that all pending claims are allowable and respectfully requests a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

Respectfully submitted,
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